Nursing interventions for the client having a CT scan of the head are described in the Nursing Implications box below.

- **Arteriography** of cerebral vessels is performed to demonstrate abnormal vessel structures, vasospasm, loss of vessel wall integrity, and stenosis of the carotid arteries.
- **Transcranial ultrasound Doppler (TCD)** studies are used to evaluate the velocity of the blood flow through the intracranial arteries and provide information about partial or complete occlusion.
- **Magnetic resonance imaging (MRI) test** may be conducted to detect shifting of brain tissues as a result of hemorrhage or edema. A magnetic resonance angiography (MRA) may be performed to detect occlusive disease of the large cerebral vessels.
- **Positron emission tomography (PET)** and **single-photon emission computed tomography (SPECT)** are used to examine cerebral blood flow distribution and metabolic activity of the brain. Both tests use very short-lived radionuclides that emit radioactive energy as they move through the circulation. PET allows the identification of the location and size of the stroke; SPECT provides information about the metabolism of and blood flow through the brain tissue affected by the stroke.

### Nursing Implications for Diagnostic Tests

#### Computed Tomography (CT) of the Head

**Preparation of Client**
- Ensure a signed consent form.
- Check hospital policy on withholding food and fluids. Clients are usually on NPO status (except for the medications ordered as part of the test) for 8 hours before the test if it is done in the morning. If the test is done in the afternoon, the client may have a liquid breakfast.
- Give medications up to 2 hours before test.
- Assess for possible reaction to iodine dye (by asking about allergy to seafood). Document any allergy and inform the physician and radiology department.
- Remove metal hairpins, clips, and earrings.

**Client and Family Teaching**
- *(if applicable)* Do not drink or eat anything before the test except for the ordered medications.
- You may be given an intravenous infusion. When the contrast dye is injected, you may feel warm and have a metallic taste in the mouth.
- The exam lasts from 30 to 90 minutes.
- Your head will be positioned in a cradle, and a wide rubber strap will be applied snugly across the forehead during the test (to keep your head immobilized).
- The CT scanner is circular with a round opening. You are strapped to a special table, and the scanner revolves around the body part to be examined. The scanner makes a clicking noise.
- The test is painless.
- Someone is always immediately available during the test.

- **Lumbar puncture** may be performed to obtain cerebrospinal fluid for examination if there is no danger of increased intracranial pressure. (Removal of cerebrospinal fluid when intracranial pressure is increased can result in herniation of the brainstem.) A thrombotic stroke may elevate cerebrospinal fluid pressure; after a hemorrhagic stroke frank blood may be seen in the cerebrospinal fluid. Nursing interventions for the client having a lumbar puncture are described in the Nursing Implications box on the next page.

### Medications

Medications are administered to prevent a stroke in clients with TIA or a previous stroke, and to treat the client during the acute phase of a stroke.

### Prevention

Antiplatelet agents are often used to treat clients with TIA or who have had a previous stroke. Platelets are concentrated in high blood flow arteries, they adhere to endothelial tissue damaged by atherosclerosis and occlude the vessel. The drugs used to prevent clot formation and blood vessel occlusion include aspirin, clopidogrel (Plavix), dipyridamole (Persantine), pentoxifylline (Trental), and ticlopidine (Ticlid).

Daily low-dose aspirin reduces TIA occurrence and stroke risk by interfering with platelet aggregation. Ticlopidine (Ticlid) is a platelet-aggregation inhibitor that has shown reduction in thrombotic stroke risk.

### Acute Stroke

Pharmacologic agents are used to treat the client during the acute phase of an ischemic stroke to prevent further thrombosis formation, increase cerebral blood flow, and protect cerebral neurons. The type of medication used varies according to the type of stroke.

Anticoagulant drug therapy (discussed in Chapter 31) is often ordered for thrombotic stroke during the stroke-in-evolution phase but is contraindicated in completed stroke because it may increase the risk of cerebral hemorrhage. Anticoagulants are never administered to a client with a hemorrhagic stroke. Anticoagulants do not dissolve an existing clot but prevent further extension of the clot and formation of new clots. Sodium heparin may be given subcutaneously or by continuous IV drip, or warfarin sodium (Coumadin) may be given orally.

Thrombolytic therapy, using a tissue plasminogen activator such as recombinant alteplase (Activase rt-pa), sometimes given concurrently with an anticoagulant, is used to treat thrombotic stroke. The drug converts plasminogen to plasmin, resulting in fibrinolysis of the clot. To be effective, it must be given within 3 hours of the onset of manifestations (Tierney et al., 2001).

Antithrombotic drugs, which inhibit the platelet phase of clot formation, have been used as a preventive measure for clients at risk for embolic and thrombotic CVA. Both aspirin and dipyridamole have been used for this purpose. These drugs are sometimes also used in combination with other drugs during acute treatment. Antiplatelet agents are contraindicated in clients with a hemorrhagic stroke.